

HERD STRUCTURE AND INCIDENCE OF SUPERNUMERARY TEATS IN MALLHOLDER GOAT PRODUCTION IN KANO STATE

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ABSTRACT

Fifty-eight (58) goat herds were randomly selected in Kano state and survey to evaluate the smallholder goat herd structure and incidence of supernumerary teat. The results revealed that the herd size of the smallholder goat in the study area ranged from 4 to 30 with the mean herd size of 11.6. Within the herds, there were more adult (67%) than young (33%) goats. For the young goats, the males (55%) were more than the females (45%). However, in the adult (breeding) goats, the females (82%) were more than the males (18%). Within the breeding females, the nanny does (72%) were more than the maiden does (28%). Herd size significantly ($P < 0.05 - 0.01$) influenced the goat herd attributes except breeding males ($P > 0.05$). Young goats, young males', young females, adult goats, breeding females, maiden does, nanny does and buck to doe ratio increased with herd size. Buck to doe ratio was significantly ($P < 0.01$) and positively correlated with all the herd attributes ($r = 0.41 - 0.63$) except breeding males ($r = -0.39$). The number of adult goats in the herd was significantly and positively correlated with herd size and young goats ($r = 0.30-0.58; P < 0.01-0.05$). The number of young males and females in the herd was significantly and positively correlated with young goats ($r = 0.53-0.94; P < 0.01$) but not with litter size. The incidence of supernumerary teats was not common (11%) and was observed to decreased with increase in herd size. Good breeding herd management system that would ensure the use of proven sire in a good mating ratio would improve herd performance

KEYWORDS: herd size, herd structure, supernumerary teats, Red Sokoto goats, smallholder goats

INTRODUCTION

Goat rearing is becoming increasingly popular among smallholder farmers. Goat production is regarded as a feasible means to improve the income and nutrition of rural communities and to bring these communities into commercial marketing systems (Braker *et al.*, 2002). With the increasing human population and diminishing available agricultural land sizes, it is becoming difficult for small-scale farmers with very small land holdings to keep large ruminants. The goat has become very popular in recent years as a pathway out of poverty (Ahuya *et al.*, 2004) and as good source of meat and milk to the rural populace. One of the major udder abnormalities that affect milking efficiency of dairy animals is the presence of supernumerary teat, although it is not uncommon and hereditary in goats to have a kid born with extra teat or teats (supernumerary) with multiple ends. These small teats are commonly imperforated and are not harmful but occasionally they leak during milking and they can also become infected from time-to-time. Therefore, female kids should be examined for this abnormality.

Currently, many Non-Governmental Organizations (NGOs) working with resource-poor livestock keepers in medium to high potential areas are encouraging farmers to keep improved goat genotypes. Despite the recognized contributions of goats on smallholder farms, such roles and contributions have not fully been studied and quantified (Akpa 1999; Akpa *et al.*, 2001). The knowledge of the smallholder herd structure and the system of management is essential for identifying opportunities to shape the future of small ruminant production in Nigeria. There is, therefore, need to study the herd structure of this smallholder goat Production and quantify the production, reproduction and socio-economic issues that affect goat production. This is expected to influence policy formulation that may lead to economically sustainable production in smallholder livestock systems.

The objective of this study therefore, is to evaluate the smallholder goats herd structure and incidence of supernumerary teat.

MATERIALS AND METHODS

Study location

The study was conducted in Kano and environs, located within the Sudan Savannah Zone of Nigeria. The area is situated between longitude 9°30' and 12°30' North, and latitude 9°30' and 8°42' East. The climate is characterized by dry and wet seasons. The dry season stretches from October to April, while the wet season is from May to September. The annual rainfall and temperature is between 787 and 969mm and 21-39°C, respectively (IAR, 2005).

Animal management

The animals were managed under the traditional smallholder system. They were released for grazing in the morning at 8.00am and kraaled at night. The goat houses were made using corn stalk for fencing and thatched roof for protection against heat and rainfall. The houses were open sided for adequate ventilation. There was no organized health care provision in terms of vaccination and deworming. However, veterinary officers were called to treat the animals when cases of ill-health occur. Supplementary feeding of the animals was sometimes done in the morning before turning them out for grazing and in the evening before they were kraaled. The feeds supplements include; groundnut haulms, beans pods, maize/ millets or sorghum offals. The kids were allowed to run with their dams throughout the study period, and weaning was by natural means.

Survey Scope, Sampling Method and Data Collection

The study commenced with primary visits to identify goat herds and individual herd size in Kano metropolis and its environs. Fifty-eight (58) goat herds were randomly selected and surveyed. The herd attributes surveyed were: herd size (HS), young goats (YG), adult goats (AG), breeding males (BM), breeding females (BF), maiden does (MD), nanny does (ND), litter size (LS) and buck to doe ratio (BDR). The herd size was categorized into 3 (<10, 11-20 and 21-30) and the effect of herd size on the measured attributes determined. All information obtained was used to evaluate the herd structure of smallholder goats in Kano.

Attributes measured for the supernumerary teat were: HS, population of female goats per herd, female goats with normal teats per herd, female goats with supernumerary teats per herd, number of females with unilateral or bilateral supernumerary teat per herd. The distribution of Supernumerary teat according to herd size was determined.

Data analysis

The data collected were analyzed by analysis of variance (ANOVA) procedure of SAS (1999) and the means were separated by Duncan Multiple Range Test procedure of SAS (1999). The correlated relationship between the measured attributes was determined using correlation analysis procedure of SAS, (1999).

RESULTS

The descriptive statistics of smallholder goat herds in Kano and its environs is presented in Table 1. The average herd size, young goats, young males, young females, adult goats, breeding males, breeding females, maiden does, nanny does, buck to doe ratio and litter size was 11.6, 3.8, 2.1, 1.7, 7.8, 1.4, 6.4, 1.8, 4.7, 5.3 and 1.6, respectively. The measured attributes were highly variable, with the CV varying from 42.8 to 120.7%. Within the herds, there were more adult (67%) than young (33%) goats. For the young goats, the males (55%) were more than the females (45%). However, in the adult (breeding) goats, the females (82%) were more than the males (18%). Within the breeding females, the nanny does (72%) were more than the maiden does (28%).

Table 2 shows the effect of herd size on the distribution of goats according to the measured attributes. Herd size significantly ($P < 0.01$) influenced the goat herd attributes except breeding males ($P > 0.05$). Young goats, young males, young females, adult goats, breeding females, maiden does, nanny does and buck to doe ratio increased with herd size.

The incidence of supernumerary teat in smallholder goat herd in Kano and its environs is presented in Table 3. The observations on the female goats showed that most of the does had normal teat (89%) with 11% of them having supernumerary teat. Majority of the does that had supernumerary teat had it unilaterally exhibited. The incidence of supernumerary teat decreased with increase in herd size, from 63% in ≤ 10 goats to 16% in 21-30 goats.

The correlated relationship between the observed herd attributes is presented in Table 4. Buck to doe ratio was significantly ($P < 0.01$) and positively correlated with all the herd attributes ($r = 0.41 - 0.63$) except breeding males ($r = -0.39$). The number of nanny does in the herd was significantly and positively correlated with all the attributes, ($r = 0.43 - 0.90$; $P < 0.01$) except maiden does ($r = 0.23$; $P > 0.05$). However, number of the maiden does in the herd was significantly and positively correlated with the number of young females, adults goats and breeding females ($r = 0.33 - 0.65$; $P < 0.01 - 0.05$). The number of the breeding females in the herd was significantly and positively correlated ($r = 0.40 - 0.97$; $P < 0.01 - 0.05$) with herd size, number of young goats (males and females), adult goats and breeding males. The number of breeding males on the other hand was significantly and positively correlated with adult goats ($r = 0.59$; $P < 0.01$) but not with herd size and young goats. The number of adult goats in the herd was significantly and positively correlated with herd size and young goats ($r = 0.30 - 0.58$ $P < 0.01 - 0.05$). The number of young males and females in the herd was significantly and positively correlated with young goats ($r = 0.53 - 0.94$; $P < 0.01$) but not with litter size.

DISCUSSION

The study of the herd structure revealed that the herd size in the smallholder goat in the study area ranged from 4 to 30 with the mean herd size of 11.6 this is comparable with the mean herd size of 10 – 40 reported by Németh *et al.* (2004). The high proliferation of males than females at the younger age is an indication that the rate of male bearing was higher than the females in these herds. However as the animals grow to maturity the males are probably sold and only few are left for breeding purposes. Also the decrease in the number of males at maturity could be attributed to differential mortality rate of males and female kids. This is inline with the earlier findings of Chikagwu-Malunga and Banda (2006) that mortality rate of suckling males were higher than the female.

The mean litter size of 1.6 obtained in this study is similar to the 1.61 reported by Taiwo *et al.* (2005) and is within the ranged of 1.5 to 1.7 reported by Adu *et al.* (1979) in Red Sokoto goat, but lower than the 1.74 reported by Iyiola-Tunji *et al.* (2008) and Akpa *et al.* (2004) in the same breed. The differences in the average litter size in these studies may be attributed to breed and environmental differences as well as managerial factors involved in the different studies.

Goat keeping and production are profitable activities and it is known that increasing prolificacy is one of the factors that determine the profitability. The litter size in this study ranged from 1 to 3. This is consistent with the report of Amoah and Gelaye, (1990) but lower than the 1 to 4 reported by Amoah *et al.*, (1996).

The significant effect of herd size on all the measured attributes underscored the importance of herd size and herd management in the improvement of the herd performance, since Performance of the herd is dependent on selecting the right animal for breeding purposes. Therefore, increase in herd size provides large gene pool for high selection intensity which will invariably increase the herd performance. Likewise, increase in herd size may increase the profitability of the farmer. However beyond certain number the law of diminishing returns may set in. Németh *et al.* (2004) reported that expenses increased significantly above income per goat as the herd size increased.

Although buck to doe ratio increased with increase in herd size, it was however observed that the bucks were under utilized particularly in the traditional smallholder management system where bucks are indiscriminately allowed to run with the does. But in a control mating system more appropriate mating ratio is used. In this study the buck to doe ratio ranged from 2 to 13. This is far below the buck to doe ratio of 1:40 used by Das and Sendalo (1990).

The low frequency of occurrence of supernumerary teats in Red Sokoto goats does in this study (11%) is similar to the 15% reported by Oseni *et al.* (2006) in WAD goats but contrary to the findings of

Amoa *et al.* (2003) that the presence of supernumerary teat constitute a major udder abnormality in WAD goats. In this study the incidence of supernumerary teats decreased with increase in herd size, this is probably due to the fact that in most of the large herds the farmers practiced some level of selection. The important thing is that the farmer should keep record on this in the herd book, since this is an inherited trait which could be avoided. The farmer can use the information kept on this trait to determine which animal can become parent for the next generation because supernumerary traits are hereditary.

The low and negative correlation of herd size with the number of breeding males was an indication that improvement in herd size depends on the quality of the breeding males rather than the number of males in the herd. However herd size depends on the number of productive animals (breeding females and nanny does) in the herd. This underscored the observed high percentage of females than the males in the smallholder herd. The high and positive correlation between herd size and the breeding ratio implies that increase in herd size would go concurrently with the increase in the number of the males to ensure appropriate mating ratio and avoid overworking the buck.

Buck to doe ratio was significantly and positively correlated with all the herd attributes considered in this study. This indicates the importance of good breeding herd management that would ensure the use of proven sire at the right mating proportion in order to achieve high productivity. Reproductive performance is one of the main determinants of productivity of goats. High reproduction rates are essential for profit in goat production (Ezekwe and Lovin, 1996) and is determined by the number of progeny kidded in a given period of time (Greyling, 2000). The biological productivity of livestock is determined by the fundamental processes of reproduction, growth and development, and death. The strong relationship observed between BF, MD and ND with both the young and adult goats indicates the important roles of does in the improvement of the herd performance with regard to conception rate and mothering ability of the doe. A good doe must be able to conceive at the right time and maintained the foetus throughout the gestation length and should have good mothering ability to rear the kid(s) to weaning. It has been reported that the reproduction rate depends on the number of litter at birth, survival rate till weaning and kidding interval (Gatenby, 1995; Sutama, 1995).

CONCLUSION

The study of the smallholder goat herd structure in Kano and environs revealed that the herd size ranged from 4 to 30 with the preponderance of males kids than females at birth. Although the buck to doe ratio increased with increase in herd size, it was however observed that the bucks are under-utilized in the smallholder management system. This therefore calls for good breeding herd management system that would ensure the use of proven sire at good mating ratio in order to improve herd performance.

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Table 1: descriptive statistics of smallholder goat herds in Kano

Characteristics	N	Mean \pm (se)	CV%	Min	Max
Herd size	58	11.6 \pm 0.95	51.6	4	30
Young goats	58	3.8 \pm 0.55	92.8	0	15
Young males	58	2.1 \pm 0.41	120.7	0	10
Young females	58	1.7 \pm 0.22	84.1	0	5
Adult goats	58	7.8 \pm 0.53	42.8	3	18
Breeding males	58	1.4 \pm 0.13	58.7	1	5
Breeding females	58	6.4 \pm 0.67	46.1	2	15
Maiden does	58	1.8 \pm 0.23	81.6	0	5
Nanny does	58	4.6 \pm 0.39	53.4	0	12
Buck to doe ratio	58	5.3 \pm 0.40	47.4	2	13
Litter size	58	1.6 \pm 0.11	42.9	1	3

Table 2: Effect of herd size on the distribution of goats according to the observed attributes of the herds

Attributes	≤ 10 goats (21)	11-20 goats (15)	21-30 goats (4)	SEM	LOS
Young goats	2.0 ^c	4.4 ^b	10.8 ^a	0.38	**
Young males	1.1 ^b	2.4 ^b	6.8 ^a	0.31	**
Young females	1.0 ^b	2.0 ^b	4.0 ^a	0.17	**
Adult goats	5.7 ^c	9.1 ^b	14.0 ^a	0.33	**
Breeding males	1.2	1.5	1.8	0.13	Ns
Breeding females	4.4 ^c	7.6 ^b	12.3 ^a	0.26	**
Maiden does	1.2 ^b	2.3 ^a	2.5 ^a	0.21	**
Nanny does	3.2 ^c	5.3 ^b	10.3 ^a	0.21	**
Buck to doe ratio	4.1 ^c	6.3 ^b	8.5 ^a	0.33	**

*0.05; ** =0.01; ns = not significant; ^{a,b,c} Means within the same row with different superscripts differ significantly (P<0.05). Figures in parenthesis are number of herds observed. SEM=standard error of mean; LOS= level of significant

Table 3: Teat distribution in does of smallholder goat herds

Attributes	≤ 10 goats	11-20 goats	21-30 goats	overall
Number of herd observed	46	9	3	58
Number of goats observed	242	125	84	451
Number of females observed	191(58)	89(26)	52(16)	332(74)
Females with normal teats	167(57)	81(28)	46(16)	294(89)
Females with supernumerary teat	24(63)	8(21)	6(16)	38(11)
Females with unilateral supernumerary teat	13(50)	8(31)	5(19)	26(68)
Females with bilateral supernumerary teat	11(92)	0(0)	1(8)	12(32)

Figures in parenthesis are percentages

Table 4: Correlated relationship between the observed attributes of the smallholder goat herd structure

Attributes	YG	YM	YF	AG	BM	BF	MD	ND	BDR
HS	-0.03	-0.09	0.03	0.30*	-0.01	0.49**	0.09	0.57**	0.51**
YG	-	0.94**	0.78**	0.58**	0.08	0.59**	0.20	0.64**	0.54**
YM		-	0.53**	0.43**	-0.01	0.49**	0.09	0.57**	0.51**
YF			-	0.56**	0.21	0.59**	0.33*	0.56**	0.41**
AG				-	0.59**	0.97**	0.60**	0.88**	0.46**
BM					-	0.40*	0.15	0.43**	-0.39**
BF						-	0.65**	0.90**	0.63**
MD							-	0.23	0.46**
ND								-	0.49**
BDR									-

*P< 0.05; ** P<0.01 HS=herd size, YG = young goats, YM = young males, YF= young female, AG= Adult goat, BM= breeding males, BF= breeding females, MD= maiden does, ND= nany does, BDR= buck to doe ratio

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